

## ATTACHMENT A

# STATEMENT OF WORK

### **PANELIST - PEER REVIEW OF THE FINAL DRAFT DOCUMENTATION FOR THE SOUTH FLORIDA WATER MANAGEMENT MODEL VERSION 5.5**

#### **I. Introduction/Background**

The South Florida Water Management Model (SFWMM) plays a critical role in South Florida for water resource management and planning purposes. Important regional water management decisions have been aided by simulations of the hydrology and water resource operational rules as provided by the SFWMM. The SFWMM is a computer simulation model capable of simulating surface water and groundwater responses to rainfall, evapotranspiration and well pumpage. Likewise, the model can predict the hydrologic response to proposed modifications to hydraulic infrastructure, changes in land use and alterations to operating rules for water control structures. The SFWMM is the only regional-scale distributed model that performs the combined simulation of hydrologic and water management components of South Florida.

Due to its widespread use in the past, present and anticipated future decision-making processes, it is necessary to document the model algorithms and procedures as well as its usage and applicability. Specifically, the objectives of the model documentation are as follows: 1) identify and layout the scientific basis of the model; 2) enumerate and explain how regional-scale management rules are implemented in the model; and 3) discuss the capabilities and limitations of the model. The document is intended to provide useful model information for interested individuals from within and outside the South Florida Water Management District (District). The District is responsible for maintaining and protecting the water resources in South Florida.

The SFWMM has been a living model – that is, it has been continuously updated, improved, and applied. Updates to the modeling period of record, updates to potential project features for various planning studies, improvements to scientific methodologies, and incorporation of new operational rules and applications are examples of upgrades to the model. Periodically, the SFWMM documentation requires updating to provide information on the numerous updates and improvements to the model. Because the model continues to play an important role in the Comprehensive Everglades Restoration Plan and other planning efforts, there is a need to conduct a peer review of the current model documentation.

Key Terms:

**Chair** – Panelist who will lead the Panel in the peer review of the SFWMM

**District** – South Florida Water Management District

## **Documentation**

**Final Draft** – Documentation of the SFWMM to be peer reviewed

**Final** – Documentation of the SFWMM after consideration of the Final Peer Review Report

**SFWMM** – South Florida Water Management Model version 5.5, which is the current version of the model

**Panel** – The Peer Review Panel, a group of five experts assembled to peer review the documentation of the SFWMM model

**Panelist** – A member of the Panel

**Project Managers** – Yanling Zhao (561-682-2043, [yzhao@sfwmd.gov](mailto:yzhao@sfwmd.gov)) and Jose Otero (561-682-6578, [jotero@sfwmd.gov](mailto:jotero@sfwmd.gov)) are the project managers for the District. Jose Otero is the point of contact.

## **Report**

**Draft** – Peer review document prepared by Panel to be submitted to the District for response and clarification

**Final** – Peer review document prepared by Panel to be submitted to the District as the final product of the peer review

**Web Board** – An Internet site implemented by the District and accessible at [http://www.sfwmd.gov/misc/1\\_webboard.html](http://www.sfwmd.gov/misc/1_webboard.html) as the primary means of communication among Panelists; and between Panelists, Project Managers, and the public. Under Florida's Sunshine Law, it is mandatory that all communications between two or more Panelists occur in a forum open to the public.

## **II. Objective**

To conduct an independent and objective review of the adequacy of the SFWMM as a regional modeling tool for addressing water resources issues in South Florida. The review shall rely on the latest documentation of the model as the primary source of information about the model.

## **III. Skill Requirements**

The Panelist shall possess the following skills:

- Excellent understanding of the principles of hydrology, hydraulics, and water resource management
- Comprehensive experience in model development, implementation, and application of hydrologic and hydraulic models, and integrated modeling systems
- Effective communication skills, particularly good writing skills
- Available to dedicate significant review effort from August through October 2005

- For Chair, excellent communication skills, particularly excellent writing skills. Experience chairing peer review panels and consolidating comments from multiple reviewers.
- Ability to conduct an objective and independent review. Panelist shall be free of any real or perceived conflict of interest, including recent modeling work for the District or for any organization involved in hydrologic or water management modeling in South Florida.

Desired skills:

- Application of regional-scale models for resolving real-world problems in water resource management; including environmental restoration, water supply, flood control, or drought management
- Demonstrated ability to understand the potential impacts to the South Florida region of simulated changes in hydrologic conditions, operational guidelines, and management objectives
- Familiarity with Unix and Fortran 77

#### **IV. Scope of Work**

Each Panelist shall provide constructive comments and participate in the successful completion of the peer review. The Chair shall lead the activities of the Panel including the development of the Report. The Peer Review shall consist of the following major tasks:

1. District provides Final Draft Documentation.
2. Panel conducts preliminary review of documentation and submits questions prior to the first workshop.
3. First workshop. District presents key aspects of the SFWMM and provides answers to questions by the Panel.
4. Draft Report. Panel submits draft report prior to second workshop.
5. Second workshop. District provides responses or clarifications to Draft Report.
6. Panel submits Final Report.

For each of the tasks above, the Chair shall coordinate the activities and products of the Panel. The Chair shall be the editor of the Report and shall compile and reconcile the contributions from the other Panelists.

The Final Draft Documentation will be delivered to the Panel for review at the start of this contract. The Panel will conduct a review of the Final Draft Documentation and submit Draft and Final Reports. The District will consider and decide how to respond to the recommendations and conclusions of the Final Report. The complete Final Report will be included in the Final Documentation as an appendix.

To comply with the requirements of the Florida Sunshine Law, all communication between two or more Panelists shall be through a Web Board specially set up for this purpose. The Web Board is ideally suited to allow Panelists to submit their comments on the documentation and to

distribute documents such as the Draft and Final Report. It also allows the District to disseminate information about this review, and it allows the general public to closely follow the development of the review.

The peer review shall be objective and independent. Each Panelist shall have no substantial personal or professional relationship with the District or any other organization involved in environmental management in South Florida. Each Panelist shall read and review the Documentation independently, then interact with each other out in the open through the Web Board and at the workshops. The Panelists shall collaborate with the Chair to develop the Report to the District.

## **V. Work Breakdown Structure**

### **Task 1. Receipt of Material**

Each Panelist will receive a hard copy of the Final Draft Documentation and a CD containing the electronic version of the documentation. Certain information in the appendices, such as spreadsheets, cannot easily be reproduced in hard copy. Therefore, certain items within the appendices will only be available in electronic format. The CD also contains other related documents which may be informative but not mandatory for the review of the model. The intent is to provide in one single document, the Final Draft Documentation, all the information necessary to conduct a review of the model. The documentation consists of a main body and appendices. The main body describes the model by topic areas. The appendices include backup material or detailed information.

The main body includes the following:

- Chapter 1 - General description
- Chapter 2 - Physical and hydrologic components
- Chapter 3 – System management components
- Chapter 4 - Calibration
- Chapter 5 - Sensitivity analysis
- Chapter 6 - Uncertainty analysis
- References
- Glossary

The appendices are as follows:

- Appendix A – Upgrades from v3.5 to v5.5
- Appendix B – Call tree flow chart
- Appendix C – Process description
- Appendix D – Subroutine description
- Appendix E – Main subroutine
- Appendix F – Input, output, and post-processing
- Appendix G – Man pages (help files)
- Appendix H – Topography update
- Appendix I – Upper Kissimmee model
- Appendix J – Tidal data
- Appendix K – Public water supply calculations
- Appendix L – Calibration and validation for specific regions

CD Only:

- Appendix M – Source code
- Appendix N – Reference spreadsheet for input files
- Appendix O – Program for cell interpolation of rainfall and ET
- Appendix P – Lake Okeechobee interactions

**Deliverable 1.1.** Panelist shall contact the District project manager via email or phone to acknowledge receipt within one day from receipt of materials.

## **Task 2. Initial Review**

The Panel shall conduct an initial review of the Final Draft Documentation and shall prepare a list of specific questions to the District based on the initial review. The purpose of the initial review is two-fold. The initial review is an opportunity for the Panel to identify aspects of the model that may not be clearly or fully covered in the documentation. The initial review will also allow the Panel to begin drafting the Report under Task 4. The Panel shall prepare questions in advance of the first workshop so that the District can provide clarification during the first workshop. The Panelists shall develop specific and general questions regarding items in the Final Draft Documentation, and shall post these questions to the Web Board in advance of the first workshop. The Chair shall assemble and coordinate these questions into a single list to submit to the District via the Web Board two weeks prior to the start of the First Workshop.

**Deliverable 2.1.** The Chair shall submit to the District a single set of questions from the Panel based on its initial review of the Final Draft Documentation. The questions shall be posted to the Web Board two weeks prior to the start of the first workshop.

### **Task 3. First Workshop**

The first workshop will last two days and will include introductory presentations by the District describing the most important aspects of the model. The workshop will also provide answers to the questions submitted by the Panel and will serve to clarify any issues raised by the Panel based on their initial review of the Final Draft Documentation. The agenda for the workshop will be developed through consultation between the District and the Chair. The District will post a draft agenda on the Web Board one week prior to the start of the workshop. Final comments to the agenda shall be posted to the Web Board by the Chair no later than two days prior to the start of the workshop. The District will provide a final agenda upon the start of the workshop. The agenda will include, at a minimum, the following items:

1. Introductory presentations of the SFWMM.
2. Demonstration of the SFWMM pre- and post-processing tools.
3. Presentation of written responses and discussion to the questions submitted by the Panel under Task 2.
4. Question-and-answer session between the Panel and SFWMM modelers.
5. Discussion of expectations of the District for the Draft and Final Reports.
6. Review of schedule and logistics for the Report.

The District will take minutes of the workshop and will post the minutes to the Web Board within one week after the end of the workshop.

**Deliverable 3.1.** The Chair shall work with the District to develop the agenda for the first workshop. The District will post the draft agenda one week prior to the start of the workshop. The Chair shall post final comments on the agenda no later than two days prior to the start of the first workshop.

**Deliverable 3.2.** Panelists shall travel to West Palm Beach and actively participate in the first workshop. “Active participation” is defined as: adhering to ground rules established by the workshop facilitator, attending all presentations, letting presenters know when any part of the presentation is not understood, be familiar with the District expectations for the peer review, and be ready to work within the schedule and through the logistics for the peer review.

#### **Task 4. Draft Report**

The Panel shall comment on the Final Draft Documentation, on answers and information provided during the first workshop, and on clarification to the documentation provided by the District. Reference information will be provided to the Panel in a disc, but reviewers are not asked to comment on reference material. The Chair shall be the editor of the Report and shall coordinate all the activities of the Panel to this end. Panelists shall provide their products to the Chair in a timely fashion closely following the review schedule developed during the first workshop. Panelists shall be contributors to the Report.

The Panel shall review the SFWMM documentation and provide comments and recommendations on, but not limited to, the following:

1. Correct application of scientific principles
2. Appropriate representation of the South Florida water management system
3. Adequacy to simulate system-wide hydrologic responses

Comments are also sought regarding the overall structure of the Final Draft Documentation, its readability of both text and illustrations (tables and figures), and its value as a comprehensive documentation of the SFWMM. For areas in which the Panel identifies deficiencies, specific recommendations to resolve the deficiencies are required to facilitate revisions of the document.

It is recognized that each member of the Panel will comment most substantively on areas within their primary expertise, but comments are welcome on any aspect of the SFWMM. The District also acknowledges that a review of the model source code is not feasible within the schedule for this review. Although the source code and related material will be provided as an appendix, it shall be considered auxiliary to the documentation. The Panel is not asked to comment on the source code. The Final Draft Documentation shall be used as the primary basis of information on the structure, functions, processes, features, rules, and capability of the SFWMM.

In addition to comments and recommendations, the Report shall include specific responses to the questions below. The responses by the Panel shall be stated in the most unambiguous manner possible based on the SFWMM documents provided and the explanations presented. The Chair shall pay special attention to ensure that the questions are fully answered.

A. Clarity and appropriateness of the documentation

Are the objectives of the documentation clear? Are the objectives met? Is it readable? Are the figures clear? Are additional levels of detail required to serve the intended objectives? After reading the documentation, are you able to understand the purpose, scope, strengths, and limitations of the SFWMM? Does the scope or format of the documentation need to be modified or expanded?

B. Model Structure

1. Based on the documentation and presentations provided by the District, are the modeling techniques and methodologies used in the SFWMM appropriate for the temporal and spatial scale of the model?
2. Are the following model structure components appropriate?
  - a. Grid resolution and structure
  - b. Grid spatial extent
  - c. Time step
  - d. User-specified input
  - e. Logic in representation of the system
  - f. Numerical methods
  - g. Boundary conditions
  - h. Model output
  - i. Others

C. Physical and Hydrologic Processes

1. Does the SFWMM include all the important physical and hydrological processes necessary to address regional-scale water resource issues in South Florida?
2. Are the following physical features and hydrologic processes represented adequately?
  - a. Rainfall
  - b. Evapotranspiration
  - c. Land use
  - d. Topography
  - e. Overland Flow
  - f. Groundwater Flow
  - g. Channel Flow
  - h. Levee seepage
  - i. Coupling of Processes
  - j. Others

D. Structural Features and Operational Rules

1. Does the SFWMM include all the important structural and operational rules to address regional-scale water resource issues in South Florida?
2. Are the structural features and operational rules addressed adequately?
  - a. Water control structures
  - b. Canal flow routing
  - c. Flow computation
  - d. Lake Okeechobee operations
  - e. Water Conservation Area operations
  - f. Flood control operations
  - g. Environmental operations
  - h. Consumptive-use water supply and water shortage operations
  - i. System storage components (e.g. reservoirs, ASR, etc...)
  - j. Local management features (e.g. agricultural practices)
  - k. Others



E. Calibration and Validation

Is the model calibration process adequate for a predictive model in water resources management? Based on available tools, procedures, and data; is the model validation/verification procedure conducted in an appropriate manner?

F. Overall appropriateness of model comparable to others outside South Florida

Is the level of sophistication of the SFWMM comparable to other modeling efforts outside South Florida directed towards addressing similar complex, regional-scale, water-related issues? Given the current state of the model (scale, sophistication of algorithms, and degree of calibration), can it be considered an adequate tool for such an application?

The outline of the Report shall consist, at a minimum, of the following:

1. Introduction
2. Adequacy of Physical and Hydrological Processes
3. Adequacy of Structural Features and Operational Rules
4. Calibration and Validation
5. Sensitivity and Uncertainty
6. Responses to Specific District Questions (stated above)
7. Overall Findings and Recommendations
8. Appendices
  - a. Scope of work for Peer Review
  - b. Workshop questions and answers
  - c. Panelist comments

*Panel concurrence on each topic is strongly recommended. In the event that differences of opinion cannot be reconciled by the Chair, then they may be reported as such or as minority opinions.*

**Deliverable 4.1.**

Deliver a Draft Report. Provide comments and recommendations based on the review of the SFWMM documentation. The Chair shall coordinate, collect, and consolidate the individual comments, conclusions, and recommendations by the Panel. The Report shall be written in Microsoft Word and posted to the Web Board. The Panel shall answer in the most unambiguous manner the questions posed by the District under Task 4.

## **Task 5. Second Workshop**

The second workshop shall also last two days and is intended to provide responses or clarifications to the Draft Report. The agenda for the workshop will be developed through consultation between the District and the Chair. The District will post a draft agenda on the Web Board one week prior to the start of the workshop. Final comments to the agenda shall be posted to the Web Board by the Chair no later than two days prior to the start of the workshop. The District will provide a final agenda upon the start of the workshop.

The District will prepare written responses or presentations for the workshop, as appropriate. At the workshop, the Panel and the District will discuss any issues related to the Draft Report.

The Panelists shall discuss the use of any new information received during the workshop related to the Final Report. The Chair shall facilitate this meeting. District staff will be available during this period to provide information to the Panel as requested by the Chair.

**Deliverable 5.1.** The Chair shall work with the District to develop the agenda for the second workshop. The District will post the draft agenda one week prior to the start of the workshop. The Chair shall post final comments on the agenda no later than two days prior to the start of the second workshop.

**Deliverable 5.2.** Panelists shall travel to West Palm Beach and actively participate in the first workshop. “Active participation” is defined as in the first workshop.

## **Task 6. Final Report**

The Final Report is the primary product of this contract. The Panel shall work collaboratively to produce the Final Report based on the Draft Report, any new information received during the second workshop, and any other information received from the District. The Chair shall seek consensus among the Panelists. Each Panelist is responsible for cooperating with the Chair in the development of the Final Report. The Chair is responsible for coordinating and delivering the Final Report. All Panel interaction for the development of the Final Report shall continue to be conducted through the Web Board. The Final Report shall be posted to the Web Board.

**Deliverable 6.1.** Deliver a Final Report

**VI. Summary Schedule of Deliverables and Payments**

A summary deliverable schedule for each task associated with this project is set forth below. All deliverables submitted hereunder are subject to review by the District and outside agencies. However, the District shall maintain responsibility for coordinating project direction, including final approval of all project deliverables.

The Chair hereby agrees to provide the District all deliverables described in the Statement of Work in Microsoft Word. Acceptability of all work will be based on the judgment of the District that the work is technically credible, accurate, precise, and timely.

**After issuance of purchase order:** Payment shall be made following receipt and acceptance by the District of project deliverables in accordance with the schedule set forth below. Payment by the District for all work completed herein shall not exceed the TOTAL listed in the table below.

	<b>Panelist</b>				
	Rate	Hours	Payment	Travel	TOTAL
FY05	\$150/hr	110	\$16,500	\$1,000	\$17,500
FY06	\$150/hr	55	\$8,250	\$1,000	\$9,250
TOTAL	\$150/hr	165	\$24,750	\$2,000	\$26,750

This contract must be executed through two separate purchase orders. The first purchase order will be executed for Tasks 1 through 4 and will be paid from the fiscal year 2005 funds already set aside for this purpose. A second purchase order will be executed for Tasks 5 and 6 and will be paid from fiscal year 2006 funds subject to approval by the District Governing Board.

### Schedule of Deliverables and Payments

Task No.	Deliverables	Due Date From Receipt of Materials on August 5, 2005	Panelist Payment
1	1.1 Acknowledge receipt of materials	1 day (Aug. 6, 2005)	
2	2.1 List of questions upon initial review	3 weeks (Aug. 26, 2005)	
3	3.1 Develop agenda for first workshop 3.2 Participate in first workshop	5 weeks (Sep. 9, 2005)	
4	4.1 Draft Report	8 weeks (Sep. 30, 2005)	\$ <u>17,500</u>
5	5.1 Develop agenda for second workshop 5.2 Participate in second workshop	10 weeks (Oct. 14, 2005)	
6	6.1 Final Report	12 weeks (Oct. 28, 2005)	\$ <u>9,250</u>
<b>TOTAL</b>		<b>12 weeks</b>	<b>\$ <u>26,750</u></b>